Institutional Barriers to Coastal Resilience

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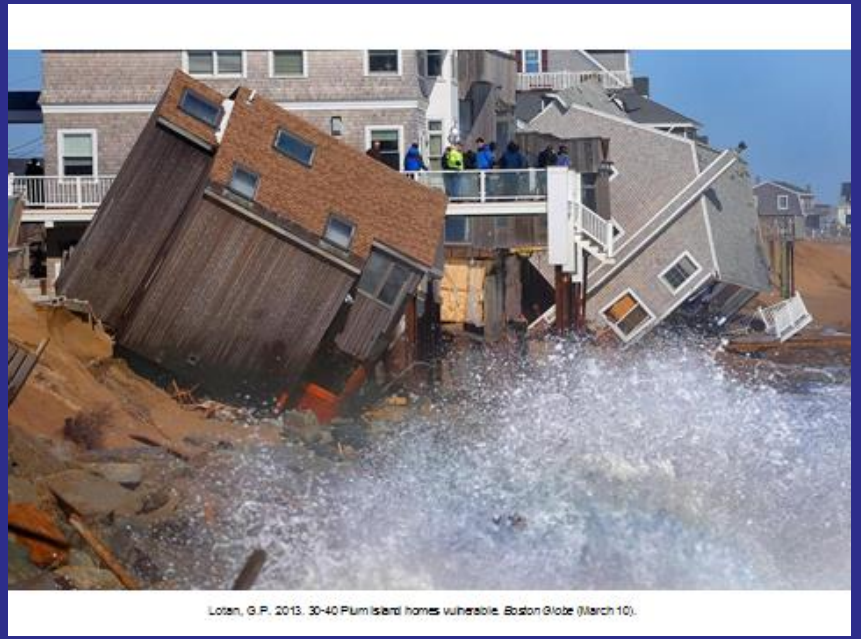
Take-Away Points

- Coastal resilience is about “bouncing back” from a natural hazard (flooding, erosion, property loss)
- A measure(s) of coastal resilience should be chosen and observed
- (Only then can we know what might lead to it!)
- The coastal environment has been built-out (but it’s still expanding)
- Economic incentives are aligned (and policies have been designed) to protect coastal properties, not to abandon-and-retreat
- Coastal communities have been observed to “bounce back,” but are there net benefits from protection?



Lotan, G.P. 2013. 30-40 Plum Island homes vulnerable. *Boston Globe* (March 10).

Plum Island
Newbury, MA
(March 2013)

- What is “resilience”?
- Why is it needed?
- How can it be measured?
- How can it be achieved?
- Are there obstacles?

What is resilience?

Coastal resilience means building the **ability of a community to "bounce back"** after hazardous events such as hurricanes, coastal storms, and flooding – rather than simply reacting to impacts.

Resilience is important everywhere because all communities face hazard threats such as droughts and flooding. Coastal areas have additional hazard risk from storms such as hurricanes and increased population pressures, making resilience particularly important

Search Our Facts

search

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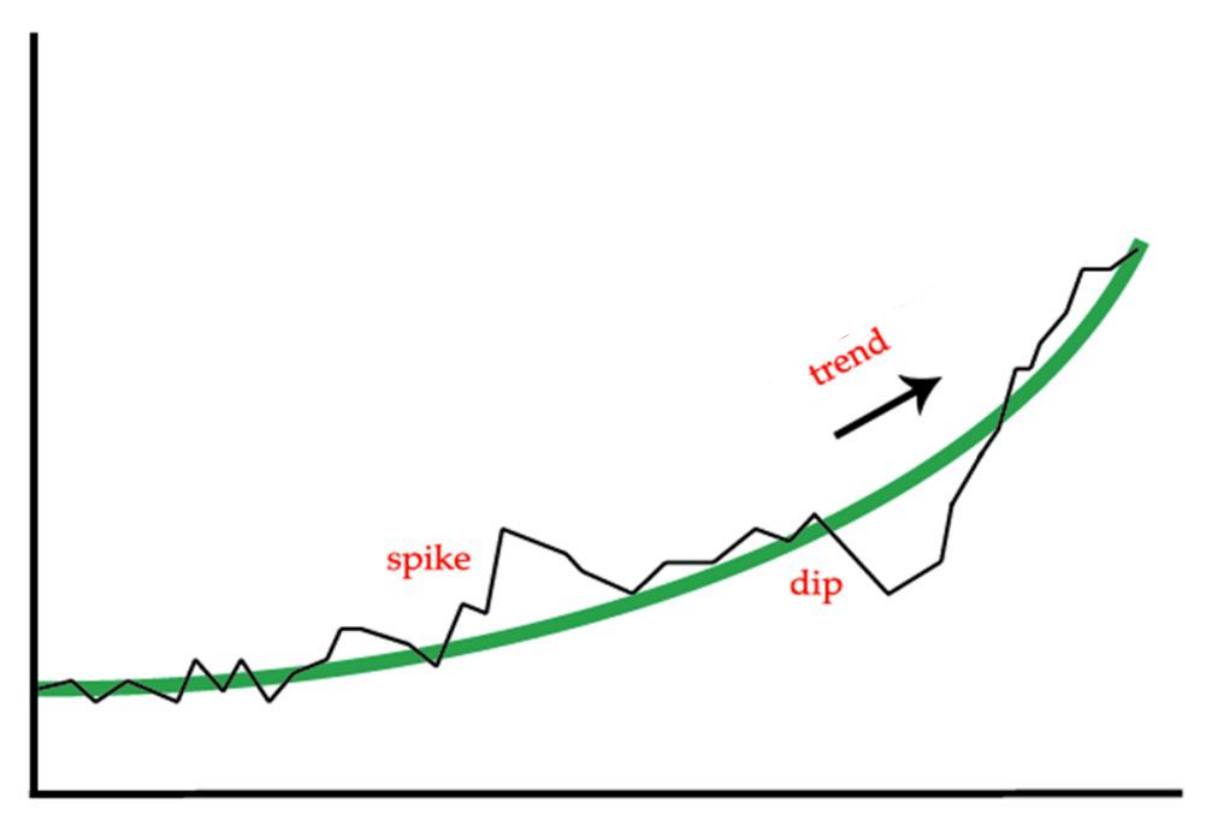
Office for Coastal Management

Diving Deeper Podcast, Episode 10 (June 3, 2009) - What is resilience?

Explore: Natural Hazards Assessment

Vulnerability and Resilience

resilience metric



time

Gibbs (2006) “Resilience: what is it and what does it mean for marine policymakers?”

- There is a lack of … performance measures for assessing resilience
- Our understanding of the factors that make a natural or social system resilient is limited
- Most communities have had little experience in managing explicitly for resilience
- These issues will need to be overcome before effective resilience-based management can be implemented

Evaluation of Existing Indicators and Indexes

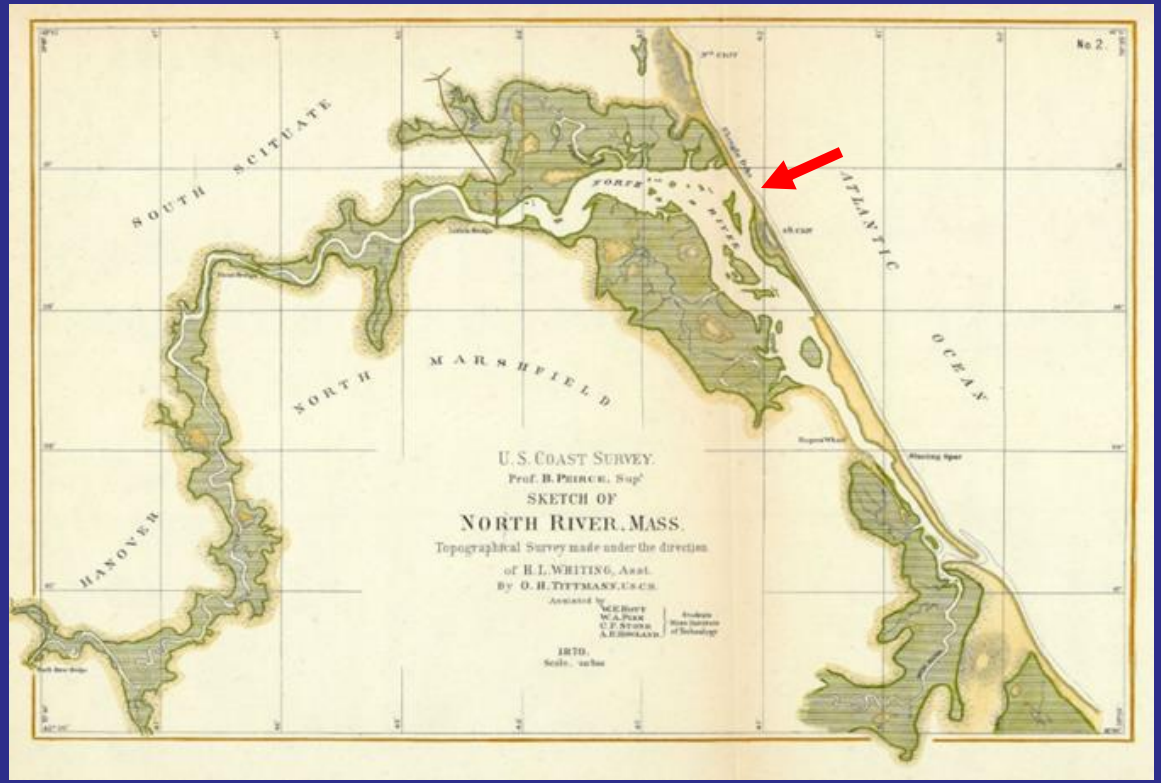
INDICATOR OR INDEX	ORIGINS	THEORETICAL GROUNDING	DATA AVAILABILITY		SIMPLICITY	ADVANTAGES	DISADVANTAGES	OVERALL FEASIBILITY
			SPATIAL	TEMPORAL				
Human Development Index (HDI)	Introduced in 1990 by the United Nations Development Programme (UNDP) in the first-ever Human Development Report (HDR)	Created to enable social scientists to evaluate development along more than just economic lines, the HDI combines health, education, and income indicators. The American HDI is based on the same dimensions but utilizes more "American" indicators.	*HDI* – National level; *AHDI* – Metropolitan, county, and state levels	HDI rankings have been released annually since 1990; AHDI rankings have been published at different spatial resolutions for 2008-2009, 2010-2011, and 2013-2014.	*Medium* – Three characteristics are measured and combined.	*Scope* – The HDI examines more than just income, including two other components of well-being, health and education. *Mutability* – In 2010, the HDI was modified to account for economic inequality, measured using the UNDP's Coefficient of Human Inequality. The existence of the AHDI also demonstrates the HDI's adaptability.	*Lack of environmental indicator* – Despite its efforts to include additional dimensions of development, the HDI fails to factor in the health of the natural world.	Medium

- Per Capita Personal Income
- Gini Coefficient
- Gross Domestic Product
- Happy Planet Index

- NOAA Coastal Resilience Index
- Resilience Capacity Index
- Social Vulnerability Index
- Hurricane Disaster Risk Index

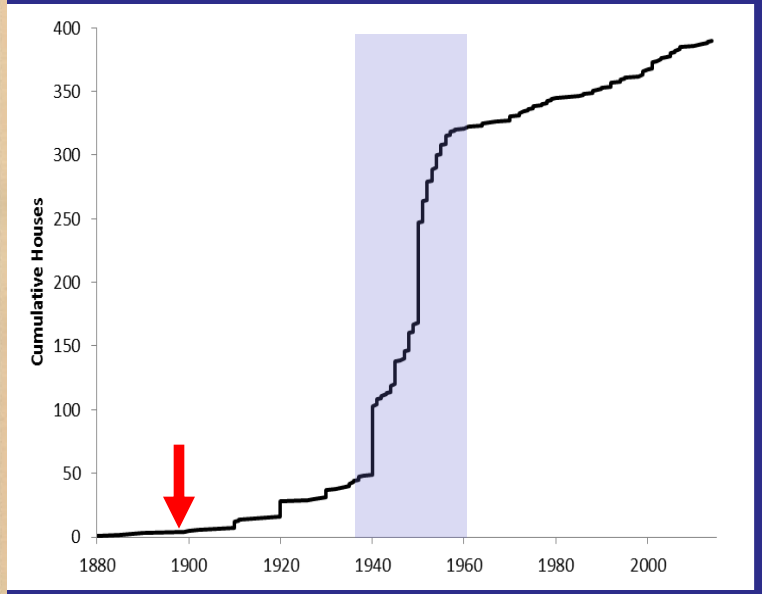
The “Portland Gale”

(27-28 November 1898)



Humarock’s “Shingle Dyke” breached between Scituate’s Third and Fourth Cliffs

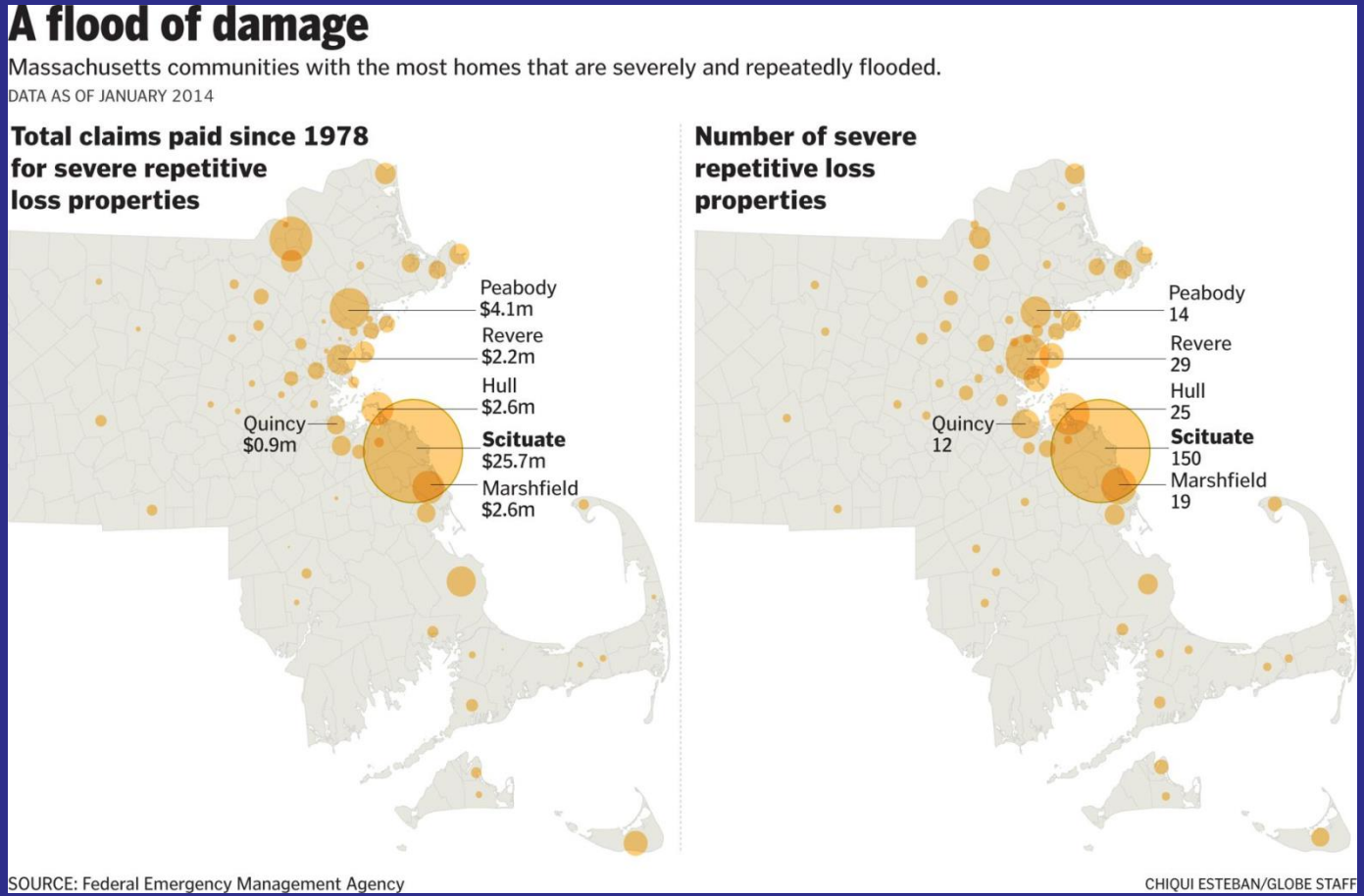
Growth of Coastal Housing on Humarock Beach, Scituate, MA (1880-2016)



George H. Walker Co., *Atlas of Plymouth County, Massachusetts* (1879)

http://www.panoramio.com/photo/34182602

Minot Beach Community
Scituate, MA 2010



Scituate has ~150 NFIP “repetitive loss properties” (40% of Massachusetts)

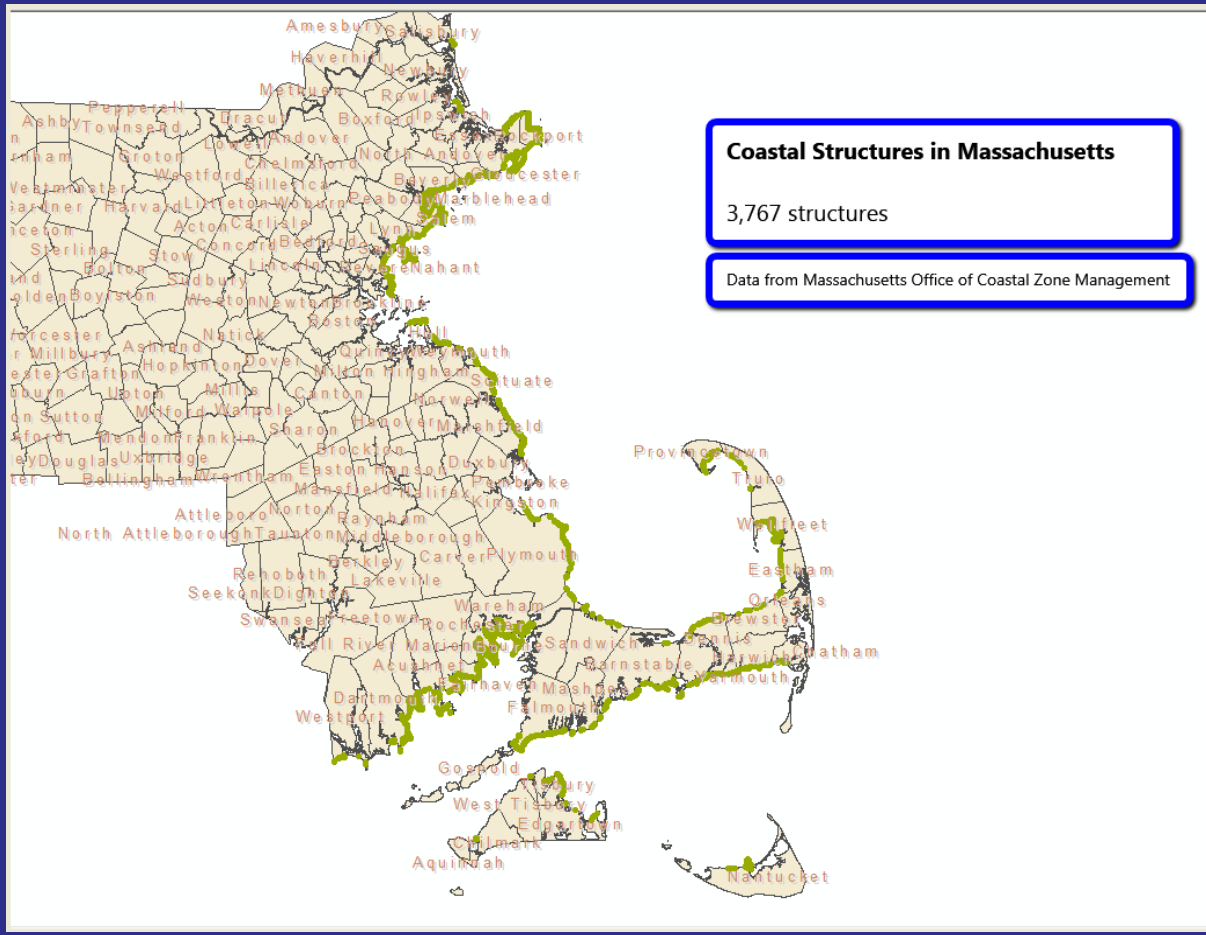
Coastal Property Owner's Decision Problem

- Yohe *et al*. decision rule
- Socially optimal timing:
  - Delay
  - Protect
  - Abandon

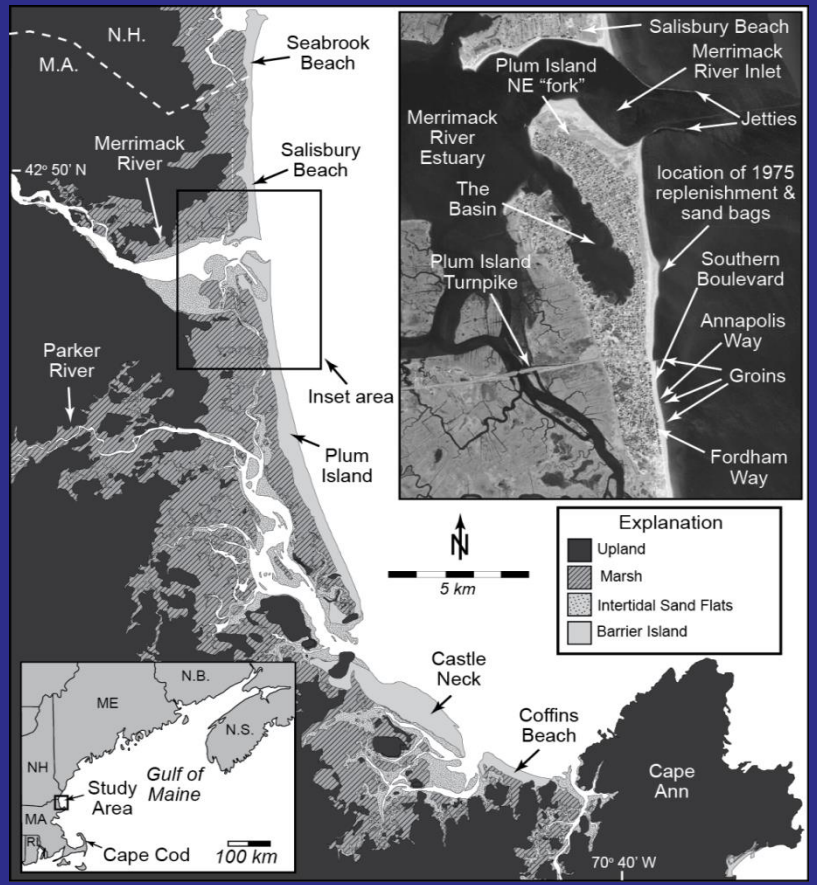
MASSACHUSETTS COAST

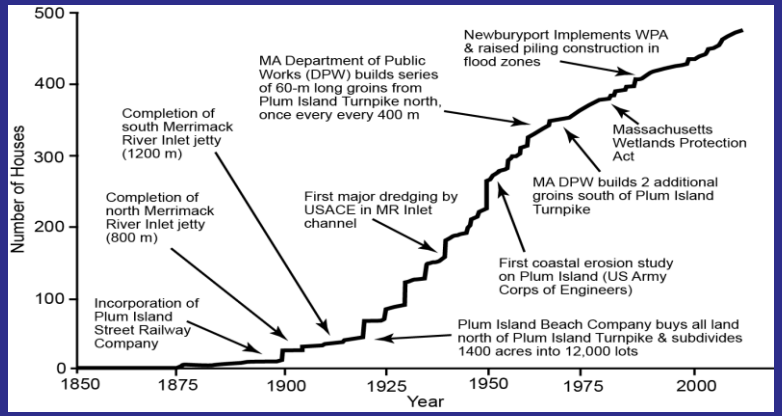
Massachusetts Coastal Protection (n = 3,767)

- Seawalls
- Revetments
- Groynes, Jetties
- Bulkheads
- Gabions
- Dune reconstructions
- Beach replenishments



Plum Island
(Inlet-associated beach)





Strong Incentives for Property Owners to Protect

Environmental/ Coastal Risk Factor	Effect on Property Value
Public Soft Structure on the Oceanfront*	35%
Oceanfront	21%
Private Hard Structure on Basin*	19%
Basin	16%
Back-barrier	13%
Elevation on Pilings**	6%
Marsh	5%

*Resistance
**Redundancy
Contingency

Muir-Wood (2016)

Strong Incentives for Communities to Protect

- Municipal property tax assessments
- Public infrastructure investments (roads, sewer, water)
- Historical tradition of community

Leading to:

- Political pressures (local to state)
- Threats of litigation

Photo: Christin Walth
http://www.plumislanderosion.com/2013-03-05-13-05-49/short-term-erosion-control-measures/beach-scraping.html

Are there Net Benefits of Protection?

- Benefits
  - Aesthetic views
  - Place to live
  - Beach amenities
  - Recreation
  - Community traditions
- Costs
  - Losses of property
  - Risks to human health
  - Protective structures
  - Disaster responses

Should “abandon-and-retreat” be part of the discussion?

Photo: *Boston Globe*
Brant Rock, Marshfield, MA (March 2013)

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